An Empirical Validation Of The Primary And Moderating Effects Of Income And Capital On Familiarity And Participation Of Limited Resource Farm Producers (LRFPs) In USDA Agricultural Programs

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ABSTRACT

We present empirical findings on the problem of low participation rate of Limited Resource Farm Producers (LRFPs)[1] in USDA programs. Our analysis is based on survey data directly sourced from LRFP population spread across twenty counties in Southern Virginia. The findings revealed that familiarity with and participation in USDA programs varied by type of farmers. While familiarity was moderate, participation was low. These main effects were moderated by access to capital. Our results broadly agree with findings from similar studies done on the subject in the past with an additional empirical insight that access to capital can enhance participation in USDA programs. We conclude the study with several practical ways for improving LRFP participation in USDA agricultural programs

Keywords: United States Department Of Agriculture (USDA); National Institute Of Food And Agriculture (NIFA); Limited Resource Farm Producers (LRFPS); Virginia Cooperative Extension (VCE)[2]; Income And Non-Income Drivers Of Entrepreneurship; Access To Capital

1. INTRODUCTION

The problem of low participation rate of LRFPs in USDA farm programs and opportunities[3] continues to attract the attention of business and agricultural economists, industry analysts, and policymakers. The current study is unique in several ways. First, while empirical studies investigating the historically low participation rate of LRFPs in USDA farm programs are widely available in economic and agri-business literature, most the studies are based on the misleading premise that the LRFP population is a uniform population, when in fact the population is quite diverse — especially when investigated along the line of moderating variables. The current study represents an attempt to rectify this shortcoming, by adding relevant influencing variables to the investigation — specifically LRFPs moderated by varying level of access to capital. Second, the study is not based on secondary data that reflect contrasting opinion of scholars, but is uniquely based on primary data, sourced directly from LRFP

[1] [i] According to the USDA, a Limited Resource Farmer or Rancher or Forest Owner is a person/applicant with direct or indirect gross farm sales not more than $173,600 (for FY2016) in each of the previous two years AND a person with a total household income at or below the national poverty level for a family of four or less than 50 percent of county median household income in each of the previous two years. An entity or joint operation can be an LRFP if all individual members independently qualify. http://lrftool.sc.egov.usda.gov/LRP_Definition.aspx http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/people/outreach/slbfr/

[2] VCE is an educational outreach program of Virginia's land-grant universities: Virginia State University and Virginia Tech, and a part of the NIFA/USDA.

[3] [ii] USDA farm programs and opportunities refer to USDA agricultural programs—including, but not limited to, financial and technical assistance—provided to U.S. agricultural producers for the purpose of bolstering their efforts and initiatives in support of USDA mandate, aimed at ensuring food security for all Americans at all levels-- national, regional, state, community, etc.

themselves through surveys administered to them in the course of consecutive farm conferences and visits to farm sites. The first-hand interaction between farm agents and agricultural producers themselves provided an opportunity to directly engage LRFP audience, better understand their concerns, and monitor their feedback to survey questions. Third, the opportunity to administer the survey to the same farming population and interact with them over the course of three-and-half years (i.e. from October 2013 through February 2016) provided an opportunity to monitor changes in the characteristics of those variables which are helpful in explaining the disproportionately poor participation rate of LRFPs in USDA programs. Finally, the paper is based on recent data and reflects current characteristics displayed by the focus audience. This assures the relevance and usefulness of study's results for policy research and practical implementation.

2. LITERATURE REVIEW

Current and past studies in agricultural economics and agribusiness continue to suggest evidence of poor LRFP participation in USDA farm programs. Among them, a study by Onianwa et al. (2004), in which they used a binary logit model to analyze LRFP participation behavior in agricultural cost-share programs in Alabama. Established with the goal of reducing soil erosion on highly erodible croplands, the program provided a rental payment arrangement to participating farmers, who in turn were required to withdraw land from crop production and plant permanent trees or grass coverage for a full contact period of 10 to 15 years. According to the study, factors affecting LRFP participation in government cost-shared programs include college education, age, gross sales, ratio of owned acres to total acres, rented acres, gross value of sales, and membership in a conservation association. The study also uncovered the following findings: (1) LRFP participation in government agricultural programs tend to increase with college degrees; (2) LRFP participation increases with age; (3) farmers with large acres of land tended to enroll the less productive acres of their land in government-sponsored programs while they rent out the more productive acres for crop production; (4) farmers with large gross sales volume tended to participate more than farmers with lower sales volume; (5) farmers that have membership in agricultural conservation programs tended to participate more than farmers who do not have membership, probably suggesting evidence of a higher level of environmental awareness, fostered through membership activities.

Also, studies on LRFP behavior relative to government agricultural programs overwhelmingly suggest that while some results could be generalized across states for policy purposes, the findings are not uniform. For example, in a study of a forest stewardship incentive program in Tennessee, Bell Roberts, English and Park (1994) concluded that for Tennessee farmers, attitudes toward conservation and knowledge of forestry are more significant indicators of participation than monetary incentives, but a similar investigation by Norris and Batie (1987) for Virginia, revealed contrary findings, and concluded that financial and other socioeconomic factors were important variables influencing Virginia's farmers. Other variables that have been cited in previous studies (e.g. Nagubadi, McNamara, Hoover & Mills, 1996, Gan, Onianwa, Schelhas, Wheelock & Dubois, 2005) as important in explaining LRFP participation include farm size, gender, prior crop practice, and geographic location.

In addition to the studies in agriculture cited above, as agricultural practice gradually over time evolved from the narrow enclave of a government-controlled industry dominated by government subsidies into a mix more visibly impacted by private entrepreneurship, research studies in agriculture have also benefited tremendously from empirical studies in entrepreneurship — some of which date as far back as 1755, when Cantillon (1755) introduced the term entrepreneur in his *Essai sur la nature du commerce en général*. Since then, research in entrepreneurship has steadily grown from its erstwhile narrow regional/national focus to a global dimension. The Global Entrepreneurship Monitor (GEM) research project — a multi-national quantitative study of entrepreneurship that covers a wide variety of issues related to entrepreneurship (Bosma, Acs, Autio, Coduras & Levie, 2008) — is an outgrowth of the global research initiative. In researching entrepreneurial drivers, GEM makes a traditional division between necessity-driven and opportunity-driven entrepreneurs. Necessity-driven entrepreneurs are defined as entrepreneurs intending to start new businesses because of the need for income, while opportunity-driven are the ones motivated more by non-income drivers.

In line with above-stated theoretical proposition, in current study, we approach entrepreneurship measurement from a holistic standpoint by including three distinct categories or drivers in its measurement framework, namely: (1) income as primary driver; (2) income as a secondary driver; and (3) non-income as a driver. Also coherent with contemporary

studies in entrepreneurship (e.g. Simón-Moya, Revuelto-Taboada & Guerrero, 2014) which urge that future research studies in entrepreneurship examine entrepreneurial issues at granular levels, we limit our investigation to LRFPs, specifically investigating how income and non-income factors motivate or discourage their participation in USDA programs.

Our study also benefited from contemporary studies in entrepreneurship which investigated the role played by financial capital and its constraining effect. Among them, Kim, Aldrich & Keister, (2006); Aghion, Fally & Scarpetta, (2007); Fonseca, Michaud & Sopraseuth, (2007); Kerr & Nanda, (2009); Chaney, (2013); Beck & Demirgüç-Kunt, (2008); Carreira & Silva, (2010); and Hurst & Lusardi, (2004). Generally, scholars are universally united in the view that access to financial capital remain a major determinant for business startups (Beck & Demirgüç-Kunt, 2008; Carreira & Silva, 2010), although some studies portray evidence that the wealthy are not influenced by the availability of credit, claiming that capital shortage affects only the middle and low-income groups (Hurst & Lusardi, 2004).

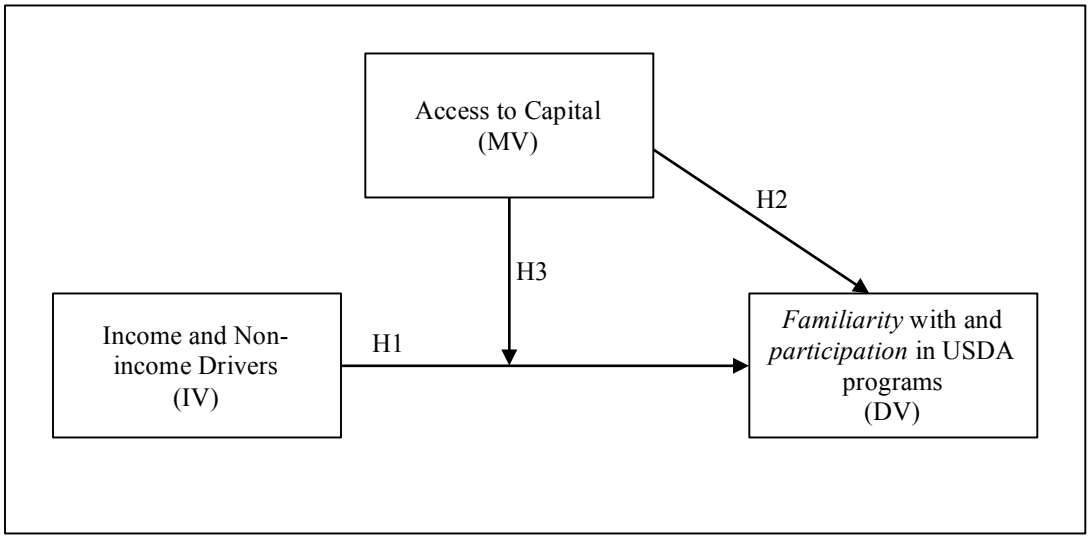
Finally, the current study is a region-focused initiative, justified by an intensifying demand by scholars for additional assessment studies that investigate the role played by entrepreneurs in regional and local economies. The demand is rationalized along the view that entrepreneurs play an important role in regional economies, through investment choices made by them, which tremendously benefit local economies (Henderson, 2002).

3. RESEARCH MODEL, QUESTIONS AND HYPOTHESES

The studies cited above provided a useful basis for guidance in selecting variables and specifying a model for our study. Along the line of research objective and above-stated needs urging for additional granular studies in entrepreneurship that study behavioral patterns of selected segments, we limit our investigation to LRFPs.

Our model, illustrated below in Figure 1, is comprised of three specific variables: (i) a dependent variable – "LRFP's familiarity with and participation in USDA programs"; (ii) an independent variable – "income and non-income related drivers of entrepreneurship"; (iii) a moderating variable – "access to capital."

Figure 1. Research Model



Next, corresponding to the above-stated model, we present our research questions and hypotheses as follows:

Research Questions	Hypotheses
RQ1: Is there a difference in LRFP familiarity with and participation in USDA agricultural programs across income & non-income drivers of entrepreneurship?	**$H_0$1:** Degree of LRFP familiarity with and participation in USDA agricultural programs vary across income & non-income drivers of entrepreneurship. [Familiarity and participation are two different constructs]
RQ2: Is there a difference in LRFP familiarity with and participation in USDA agricultural programs across levels of access to capital?	**$H_0$2:** Degree of LRFP familiarity with and participation in USDA agricultural programs vary with levels of access to capital. [Familiarity and participation are two different constructs]
RQ3: Is there a difference in LRFP familiarity with and participation in USDA agricultural programs based on income & non-income drivers of entrepreneurship and levels of access to capital?	**$H_0$3:** Degree of LRFP familiarity with and participation in USDA agricultural programs differ based on income & non-income drivers of entrepreneurship and levels of access to capital. [Familiarity and participation are two different constructs]

4. DATA AND MEASUREMENT

The data used in analysis is primary data, sourced directly from LRFPs themselves and was compiled in the course of an investigation period spanning three years. The research effort itself is the outcome of a USDA/NIFA-funded capacity building grant, titled "VSU Outreach and Technical Assistance Program for Strengthening Capacity of Virginia's LRFPs". The original three-year funding period, stretching August 2012 through August 2015, was extended for one additional year and ended in August 2016.

The data were primarily compiled from two sources: (1) farmers' conferences hosted by VCE and Small Farm Outreach Program[4]; (2) site visits done by VCE farm agents. The conference data was pooled by administering questionnaire surveys to LRFP participants that attended farm conferences, held during the grant period, while the site-visit data was gathered during farm visits that were carried out by farm agents. The first-hand interaction between extension farm agents and the target audience provided a rare opportunity to directly engage the LRFP audience, better understand their concerns, and monitor their feedback to survey questions.

A questionnaire was constructed for the purposes of the study. Reason for farming: primary source of income; secondary source; or non-income related; was assessed through a single question. Similarly, length of participation (in years and months) was measured through a single item in the questionnaire. The other two variables of interest (familiarity with USDA farm programs; and access to capital) were assessed through multiple questions, measured on a 5-point scale. Scores on multiple questions were added to create two index variables, namely, Familiarity with USDA programs; and Access to Capital. The data collection efforts resulted in 161 questionnaires filled by farmers. Some of the questions (especially, some of the items making up the index variables) were not answered by the respondents, resulting in the unequal numbers of responses used in the tests of different hypotheses.

Consistent with our study objective, aimed at investigating LRFP participation behavior in USDA funded programs, LRFPs were classified into three different groups, based on income drivers. We tested for LRFP participation rate in USDA programs by running statistical analysis for each hypothesis. Analysis of Variance (ANOVA) is the statistical method employed here to test the hypotheses. First, we tested for the effects of income and non-income drivers on participation rate. Next, the effect of access to capital on participation rate, and finally, the effect of income and non-income drivers, and level of access to capital on LRFP participation rates. The statistical significance measure is used to draw conclusion regarding support for the three stated hypotheses.

[4] The Small Farm Outreach Program is an administrative and training unit of VCE. It provides a wide range of outreach and assistance activities in production management, financial management, marketing, and other areas, to farm producers for the purpose of improving farm profitability and sustainability.

5. ANALYSES AND RESULTS

Table 1, below, is a summary of the descriptive statistics of the study variables, namely: familiarity with and participation in USDA programs (stated as dependent variables 1 and 2); access to capital (stated as moderating variable); and income or non-income drivers of entrepreneurship (stated as independent variable). The independent variable, synonymously also, the drivers of entrepreneurship, is a categorical variable comprising of three categories (1=income as primary driver; 2=income as secondary driver; and 3=non-income driver or income as non-driver). In other words, the need for income as a driver of entrepreneurship decreases as the value of this variable increases from 1 to 3 in our study.

Table 1. Descriptive Statistics of Study Variables

	N	Minimum	Maximum	Mean	Std. Deviation
Familiarity with USDA Programs (Dependent Variable$_1$)	100	12.00	60.00	28.95	15.35
Length of Participation in USDA Programs (Dependent Variable$_2$)	161	0	25	1.29	3.82
Access to Capital (Moderating Variable)	161	0.00	19.00	5.78	4.12
Income or Non-Income Drivers of Entrepreneurship (Independent Variable)	137	1	3	2.01	0.675

Tables 2A and 2B summarize ANOVA results for the test of the three hypotheses stated earlier in our research framework and presented in Figure 1 above. The main effect of "*income or non-income drivers of entrepreneurship*" on "*familiarity* of USDA programs" is significant (F value is 2.438 significant at p=0.094 level; see Table 2A) but its main effect on "*participation* in USDA programs" is not significant (F value is 0.028 at p=0.973 level; see Table 2B). This tells us that while income is a strong driver for LRFP interest in USDA programs, prompting LRFPs to want to know more about USDA farm program and opportunities, the curiosity or familiarity does not necessarily translate into actual LRFP participation in USDA programs, given that farmers are not exploiting available USDA programs and opportunities. This observation does correspond with real life, which attests to the fact that majority farm producers in this category attend USDA workshops and conferences primarily, only to satisfy their curiosity about the financial benefits associated with the programs, but do not actually follow up or utilize the services provided. In the discussion section of the paper, we try to deduce reasons for this inconsistent behavior.

It is equally interesting to observe the contrasting results for the moderating variable, *"access to capital*". While its main effect on "*familiarity* with USDA programs" is not significant (F value is 0.56 at p=0.456 level; see Table 2A), its main effect on "*participation* in USDA programs" is significant (F value is 3.911 at p=0.050 level; see Table 2B). This implies that while LRFP access to capital does not affect LRFP curiosity or familiarity with USDA programs, it does play an important role in their actual participation in USDA programs. This too does correspond with observable tendencies, which portray that larger farmers that are better endowed in capital tend to utilize USDA services more often, compared to smaller farms that are less endowed. This irony has prompted many agribusiness scholars and economists to question the rationale of USDA farm programs, considering that larger farm operations tend to avail themselves of the opportunities and benefit more than smaller farm operators do. An additional attempt to rationalize this anomaly is also made in the discussion section below.

Finally, the interaction effect of "*income or non-income drivers of entrepreneurship*" and "*access to capital*" on both "*familiarity* of and *participation* in USDA programs" is not significant (F values are 0.026 and 0.132 respectively; see Table 2A and 2B below). In the discussion section, we discuss more elaborately, the meaning and implications of the findings.

Table 2A. Tests of Between-Subjects Effects Dependent Variable 1: Familiarity with USDA Programs

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Hypothesis supported not supported
Corrected Model	3404.1[a]	4	851.0	3.914	.006	
Intercept	8332.0	1	8332.0	38.318	8332.0	
Access to Capital	122.2	1	122.2	.56	**.456**	**H_2 not supported**
Income or Non-income Drivers of Entrepreneurship	1060.130	2	530.1	2.438	**.094**	**H_1 supported**
Interaction of "Access to Capital" and "Income or Non-income Drivers of Entrepreneurship"	5.551	1	5.551	.026	**.873**	**H_3 not supported**
Error	18047.9	83	217.444			
Total	97975.0	88				

Table 2B. Tests of Between-Subjects Effects Dependent Variable 2: Length of Participation in USDA Programs

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Hypothesis supported or not supported
Corrected Model	396.561[a]	4	99.140	6.925	.000	
Intercept	38.158	1	38.158	2.666	.105	
Access to Capital	55.982	1	55.982	3.911	**.050**	**H_2 supported**
Income or Non-income Drivers of Entrepreneurship	.793	2	.397	.028	**.973**	**H_1 not supported**
Interaction of "Access to Capital" and "Income or Non-income Drivers of Entrepreneurship"	1.890	1	1.890	.132	**.717**	**H_3 not supported**
Error	1889.643	132	14.315			
Total	2602.000	137				

We proceed to granular-level analyses by first testing for equality of variances of the dependent variables across the sub-groups of the independent variable, namely, the "*income or non-income drivers of entrepreneurship.*" For the dependent variables of *familiarity* and *participation* in USDA programs, Levene's test of equality of variances was conducted within ANOVA. Results in Table 4 indicate non-homogenity of variances (F values of 3.773 and 11.667, respectively, for familiarity and participation, both of which are significant at $p<0.01$ level). Unequal variances at the sub-groups level warrant an analysis of pair-wise comparisons of sub-groups of the independent variable (drivers of entrepreneurship) which are three subgroups (1=income as primary driver; 2=income as secondary driver; and 3=non-income driver). Results in Table 3 show that pair-wise comparisons of sub-groups of "*income or non-income drivers of entrepreneurship*" are warranted.

Table 3. Levene's Test of Equality of Error Variances of Dependent Variable Across Subgroups

Dependent Variable	F	df1	df2	Sig.	Inference of the result
Familiarity with USDA Programs (Dependent $Variable_1$)	3.773	33	54	.000	Perform sub-group analysis
Length of Participation in USDA Programs (Dependent $Variable_2$)	11.667	38	98	.000	Perform sub-group analysis

Tables 4A and 4B, below, display the sub-group analyses conducted for the dependent variables, "*familiarity* of and *participation* in USDA programs" at the level of sub-groups in the independent variable, "*Income or non-income drivers of entrepreneurship*", which comprises of three distinct subgroups, namely, sub-group 1=income as primary driver; sub-group 2=income as secondary driver; and sub-group 3=non-income driver. Results presented in Tables 4A show that for "*familiarity* with USDA programs," sub-group 3 differs from subgroups 1 and 2, but sub-groups 1 and 2 do not differ from each other. Results in Tables 4B show that for "*participation* in USDA programs," sub-group 3 differs only from subgroup 1 but not from subgroup 2, and sub-groups 1 and 2 do not differ from each other. Furthermore, the sign of the mean difference (I-J) in Tables 4A and 4B is more telling about the nature of income as a driver for entrepreneurship. Our findings show that as the need for income becomes less intense and drifts into non-income drivers of entrepreneurship, both *familiarity* of and *participation* in USDA programs decline. Thus, money or need for money is a primal force for engagement in USDA programs, whether engagement is mere awareness or actual participation.

Table 4A. Bonferroni Test for Multiple Pair-wise Subgroup Comparisons

Dependent Variable: Familiarity with USDA Programs

Drivers of Entrepreneurship Sub-groups (I)	Comparison Group (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Sub-group 1 (Income as primary driver of entrepreneurship)	Sub-group 2	2.1569	4.14339	1.000	-8.0808	12.3945
	Sub-group 3	**12.0175**	4.97096	**.057***	-.2649	24.3000
Sub-group 2 (Income as secondary driver of entrepreneurship)	Sub-group 1	-2.1569	4.14339	1.000	-12.3945	8.0808
	Sub-group 3	9.8607	4.06200	**.056***	-.1759	19.8973
Sub-group 3 (Non-income as the driver of entrepreneurship)	Sub-group 1	**-12.0175**	4.97096	**.057***	-24.3000	.2649
	Sub-group 2	**-9.8607**	4.06200	**.056***	-19.8973	.1759

Dependent Variable: Participation in USDA Programs

Drivers of Entrepreneurship Sub-groups (I)	Comparison Group (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Sub-group 1 (Income as primary driver of entrepreneurship)	Sub-group 2	1.23	.681	.224	-.43	2.88
	Sub-group 3	**2.04***	.801	**.037***	.09	3.99
Sub-group 2 (Income as secondary driver of entrepreneurship)	Sub-group 1	-1.23	.681	.224	-2.88	.43
	Sub-group 3	.81	.665	.670	-.81	2.44
Sub-group 3 (Non-income as the driver of entrepreneurship)	Sub-group 1	-2.04*	.801	**.037***	-3.99	-.09
	Sub-group 2	-.81	.665	.670	-2.44	.81

6. DISCUSSION, LIMITATIONS AND IMPLICATIONS

Limitations of this study include the absence of a testing platform (or a dataset representing another farming population segment) which could have been utilized by us for experimental purposes or for authenticating the validity of the tests results executed on the LRFP farming population segment. Our study, therefore, has limited generalizability, given the absence of an experimental framework (Shadish, Cook & Campbell, 2002), and the limitation to only one segment of the farming population.

But notwithstanding this limitation, the study has numerous strengths. They include the applicability of the model to other farming population segments, originality of the data used for analysis, and the size of the sample. Cohen (1992) suggested that at significance levels of 0.05 and a power of 0.80, one would need a sample size of 783 respondents to detect a small effect (r=0.10), 85 respondents to detect a medium effect (r=0.30), and 28 respondents to detect a large effect (r=0.50). Our sample size is large enough to satisfy the suggested literature requirement literature. Additionally, as argued by Arenius and Minniti, (2005), it is important to study the perceptual drivers that attract nascent agribusiness entrepreneurs and the obstacles that they face. This is particularly important, given that the U.S. farming population is approaching retirement. According to USDA NASS 2012 survey[5], the average age of US farm operators is 58.3 years. There is, therefore, an urgent need to encourage younger-generation farm owners who will replace the

[5] USDA National Agricultural Statistics Service (NASS) 2012 Census of Agriculture.

retiring farmers. Consistent with this need, we uncover in our study that income and non-income drivers of entrepreneurship provide the needed impetus to LRFPs in seeking support from USDA programs, while liquidity and credit constraints discourage them from doing so.

7. CONCLUSION

The objective of the present study is to examine the participation of LRFP types in various USDA programs. Following an exhaustive literature review, we hypothesized that LRFP participation rate in USDA programs do vary across the LRFP types, and that the relationship is moderated by farmer's access to capital. The data obtained from LRFPs in Southeastern Virginia lend partial support to our hypotheses. Our results also indicate that LRFP participation rates in USDA agricultural programs and opportunities are low—at an average length of 1.29 years—whereas their familiarity with the same programs is at a moderate level.

Given that familiarity with USDA programs is not the constraining factor, we suggest that USDA take concrete steps to create incentives that encourage farmers to move from mere familiarity with programs to actual participation in the programs. To accomplish this, we suggest the following. First, solicit farmers' inputs, regarding the kinds of incentives that they would like to see, which can hopefully help incentivize their participation in USDA agricultural programs. Second, streamline the requirements of USDA programs to include—in addition to existing provisions—also requirements that LRFPs can reasonably satisfy (i.e. taking into account farmers' educational attainment, farm management experience, credit history, etc.). Third, forge new partnerships and consolidate existing ones among stakeholders in agriculture (i.e. government entities, private-sector agricultural businesses, commercial banks, community farming and marketing groups, farm extension offices, etc.), and mobilize them toward the common purpose of stimulating LRFP participation in USDA agricultural programs.

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